



Last revised: January 2000

Summary Status

Landings and Abundance Trends

Landings Data

## Spiny Dogfish

by  
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Spiny dogfish, *Squalus acanthias*, are distributed in the western North Atlantic from Labrador to Florida and are considered to be a unit stock in this region. During spring and autumn, they are found in coastal waters between North Carolina and Southern New England. Dogfish migrate northward to the Gulf of Maine-Georges Bank region and into Canadian waters in summer and southward in autumn and winter. They tend to school by size and, when mature, by sex. Dogfish are known to feed on many species of fish and crustaceans, but generally target the most abundant species. In the Northwest Atlantic, maximum ages reported for males and females are 35 and 40 years, respectively. The species bears live young, with a gestation period of about 18 to 22 months, producing 2 to 15 pups with an average of 6.

The principal commercial fishing gears used for catching dogfish are otter trawls and sink gillnets. Dogfish are frequently caught as bycatch and discarded during groundfish operations, particularly in the Mid-Atlantic-Southern New England area. Recreational and foreign fishing are of minor importance. The fishery is now managed under a fishery management plan developed by the Mid-Atlantic and New England fishery management councils.

Total landings peaked at 24,700 mt in 1974, declined sharply to a fairly stable average of about 6,300 mt per year during 1979-1988, and then increased sharply to more than 17,000 mt in 1990; landings increased further to a record high of 28,200 mt in 1996, and have since declined to 22,000 mt in 1998. Distant-water fleets, mainly from the Soviet Union, accounted for virtually all of the reported total from 1966 to 1977, but have since ceased to be important. United States commercial landings during 1979-1988 averaged 4,300 mt per year, but then climbed sharply to 27,200 mt in 1996. Landings in 1997 and 1998 were 18,400 and 20,700 mt, respectively. Catches in the U.S. recreational fishery increased from about 800 mt per year in 1981-1984 to about 1,400 mt from 1987-1993, but subsequently declined to 400 mt in 1998. Canadian landings increased from an average of 500 mt from 1979-1988 to a high of 1,800 mt in 1994, but subsequently declined to 400 mt from 1996-1998. Minor quantities have also been taken by European Economic Community (EEC) nations in Canadian waters in recent years.

The U.S. fishery for dogfish is similar to European fisheries in being selective for large individuals (larger than 2.3 kg [5.1 lb] in weight, and 83 cm [33 in.] in length), which are primarily mature females, to meet processing and marketing requirements. However, smaller individuals, consisting of both mature and immature males as well as immature females, are also

taken as bycatch and discarded. Quantitative estimates of discards are variable but may have been at least as high as reported landings. Discards have reportedly declined with increases in directed effort and landings in recent years.

NEFSC spring survey relative biomass estimates of spiny dogfish increased steadily from the mid-1970s to 1990 and have since gradually declined. However, mature female biomass (individuals  $\geq 80$  cm) has declined much more rapidly; estimates peaked at about 470,000 mt in 1990 and have since declined to less than 100,000 mt in 1999, a decline of over 70%.

Recruitment estimates (fish  $\leq 35$  cm) have been at record-low values since 1997; and in that year 75% of the females taken in the NEFSC spring survey were below the length at which 50% of the population is mature. Absolute estimates of fishing mortality are not available, but relative rates have increased five-fold since the late 1980s and are likely to be at least 0.34 depending on the current size-at-entry to the fishery.

As relative biomass of mature females ( $\geq 80$  cm) has fallen below 100,000 mt ( $\frac{1}{2}$  Bmsy proxy), the stock is considered to be overfished according to the SFA control rule. Fishing mortality apparently exceeds the  $F_{\text{THRESHOLD}}$  value which allows for replacement (0.11). Deteriorating resource conditions are also evidenced by trends in commercial catch per unit effort and declines in average length in commercial landings. Since this species bears small numbers of live young and has a protracted gestation period, directed fisheries for mature females appear to have significantly impacted recruitment.

### **For further information**

Brodziak, J., P. J. Rago, and K. Sosebee. 1994. Application of a biomass dynamics model to the spiny dogfish stock in the Northwest Atlantic. Northeast Fish. Sci. Cent. Ref. Doc. 94-18.

NEFSC [Northeast Fisheries Science Center]. 1994. Report of the 18th Northeast Regional Stock Assessment Workshop (18th SAW), Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 94-22. 199 p.

NEFSC [Northeast Fisheries Science Center]. 1998. [Report of the] 26th Northeast Regional Stock Assessment Workshop (26th SAW), Stock Assessment Review Committee (SARC) consensus summary of assessments. Northeast Fish. Sci. Cent. Ref. Doc. 98-03. 283 p.

Rago, P.J., K. Sosebee, J. Brodziak, and E.D. Anderson. 1994. Distribution and dynamics of Northwest Atlantic spiny dogfish (*Squalus acanthias*). Northeast Fish. Sci. Cent. Ref. Doc. 94-19.

Sosebee, K. And P.J. Rago. 2000. Abundance and distribution of elasmobranchs from the NMFS Northeast Fisheries Science Center research vessel bottom trawl surveys. Northwest Atlantic Fisheries Organization (NAFO) SCR Doc. 00/19. 26 p.

## Summary Status

Long-term potential catch (MSY)	=	<10,000 mt
Spawning biomass corresponding to MSY <sup>1</sup>	=	B <sub>MSY</sub> proxy = 200,000 mt
Minimum biomass threshold	=	½ B <sub>MSY</sub> proxy = 100,000 mt
Stock biomass in 1997-1999	=	58,000 mt (Implies stock was overfished)
F <sub>MSY</sub> proxy <sup>2</sup>	=	0.110
F <sub>TARGET</sub>	=	0.082
F <sub>1998</sub>	=	Unknown
Overfishing definition	=	F <sub>THRESHOLD</sub> <sup>3</sup> = 0.110
Age at 50% maturity	=	6 years, males 12 years, females
Size at 50% maturity	=	60 cm (23 in.), males 80 cm (30 in.), females
Assessment level	=	Size-structured
Management	=	NEFMC/MAFMC Dogfish FMP

$$M = 0.09$$

$$F_{\max} = 0.25$$

<sup>1</sup> Female spawner biomass estimated to maximize average recruitment (SSB<sub>max</sub>) is used as a proxy for B<sub>MSY</sub>.

<sup>2</sup> The fishing mortality value that allows female spawner biomass to fluctuate around SSB<sub>max</sub> is used as a proxy for F<sub>MSY</sub>.

<sup>3</sup> When female spawner biomass exceeds B<sub>MSY</sub> proxy, F<sub>THRESHOLD</sub> = F<sub>MSY</sub> proxy. When female spawner biomass is between B<sub>MSY</sub> proxy and ½ B<sub>MSY</sub> proxy F will be defined by a 10 year rebuilding period and when female spawner biomass is between ½ B<sub>MSY</sub> proxy and ¼ B<sub>MSY</sub> proxy F will be defined by a 5 year rebuilding period. At levels below ¼ B<sub>MSY</sub> proxy F should be held as close to zero as possible.

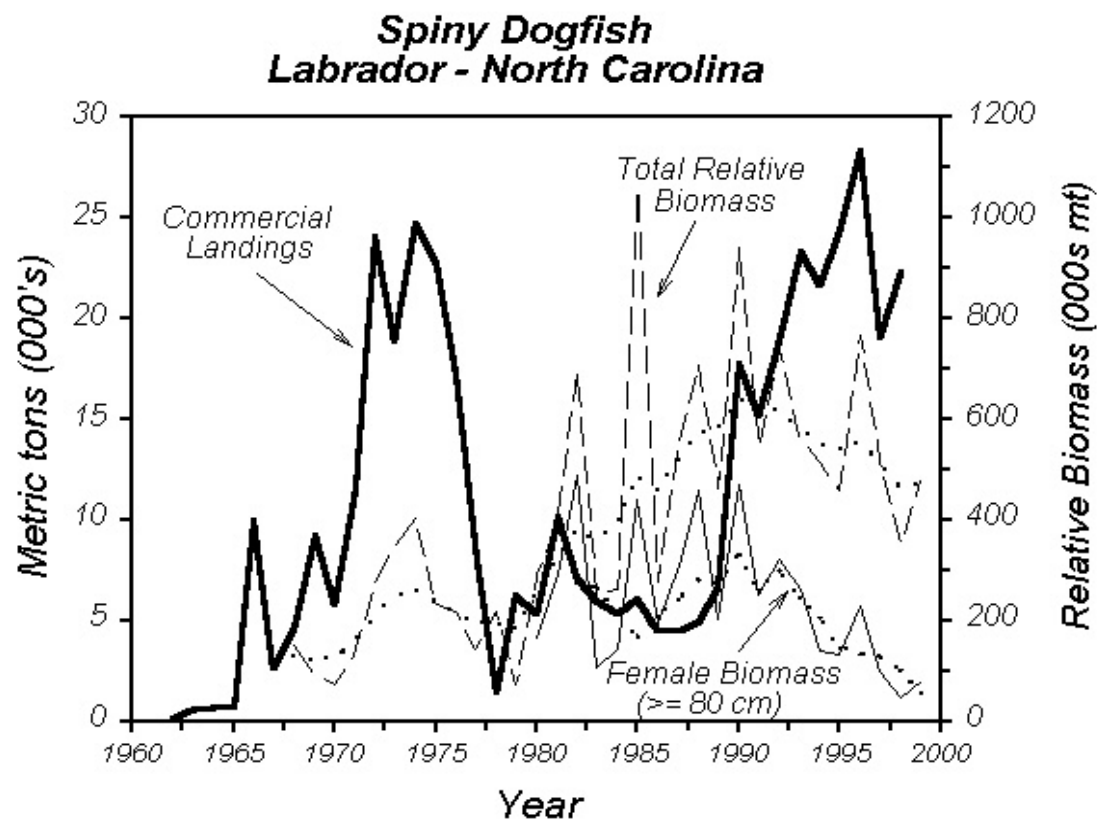


Table 25.1                      Recreational catches and commercial landings (thousand metric tons)

Category	Year										
	1979-88 average	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
U.S. recreational	1.0 <sup>1</sup>	1.8	1.3	1.5	1.2	1.2	1.1	0.7	0.4	0.8	0.4
Commercial											
United States	4.3	4.5	14.7	13.2	16.9	20.6	18.8	22.7	27.2	18.4	20.7
Canada	0.5	0.2	1.3	0.3	0.8	1.4	1.8	0.9	0.4	0.4	0.4
Other	0.5	0.3	0.4	0.2	0.1	<0.1	<0.1	<0.1	0.2	0.2	0.6
Total nominal catch	6.3	6.8	17.7	15.2	19.0	23.3	21.7	24.4	28.2	19.8	22.1

<sup>1</sup>1981-1988 average